

A BEVERAGE BOTTLING PLANT FOR FILLING BOTTLES WITH A LIQUID BEVERAGE FILLING MATERIAL, A CONTAINER FILLING PLANT CONTAINER INFORMATION ADDING STATION, SUCH AS, A LABELING STATION, CONFIGURED TO ADD INFORMATION TO CONTAINERS, SUCH AS, BOTTLES AND CANS, AND MODULES FOR LABELING STATIONS

BACKGROUND

1. Technical Field:

The present application in one aspect relates to a beverage bottling plant for filling bottles with a liquid beverage filling material, a container filling plant container information adding station, such as a labeling station, configured to add information to containers, such as bottles and cans, and modules for labeling stations.

2. Background Information:

A beverage bottling plant for filling bottles with a liquid beverage filling material can possibly comprise a beverage filling machine with a plurality of beverage filling positions, each beverage filling position having a beverage filling device for filling bottles with liquid beverage filling material. The filling devices may have an

apparatus being configured to introduce a predetermined volume of liquid beverage filling material into the interior of bottles to a substantially predetermined level of liquid beverage filling material, and the apparatus configured to introduce a predetermined flow of liquid beverage filling material comprising apparatus being configured to terminate the filling of beverage bottles upon liquid beverage filling material reaching said substantially predetermined level in bottles.

There may also be provided a conveyer arrangement being configured and disposed to move bottles, for example, from an inspecting machine to the filling machine. Upon filling, a closing station closes filled bottles. There may further be provided a conveyer arrangement configured to transfer filled bottles from the filling machine to the closing station; as well as a loading station that is configured to load filled bottles into containers, for example, in a six-pack arrangement. There may also be provided a conveyor arrangement configured to transfer filled bottles from the closing station to the loading station.

In the packaging of wares of diverse sorts, such as, for example, beverages or items of food, it has been found highly advantageous to configure the containers in which such wares are offered as advantageously and appealingly as possible. Aside from

configuration of the body of containers, the container labeling, that is ever increasing in display, also plays an increasingly important role.

When at one labeling machine several different container types are to be labeled, as is now customarily always the case, or, respectively, several diverse label sets need to be processed, down times of significant duration arise due to necessary refitting efforts. This is particularly the case in the event that containers need to be furnished with several labels at the front side and at the rear side.

In order so as to provide solutions to this problem, inter alia, in German Patent No. DE 199 53 255, in U.S. Patent No. 4,362,594, and in German Patent No. DE 197 41 476, designs are presented that allow the exchange in full of the labeling stations that are arranged at a labeling machine, so that the down times can be markedly reduced, because the required conversion work that is required to be performed at a labeling station can be accomplished at a separate work location and as such essentially at the same time, that is, without shut-down of the labeling machine.

German Patent No. DE 199 53 255, U.S. Patent No. 4,362,594, and German Patent No. DE 197 41 476 are hereby incorporated by reference as if set forth in their entirety herein.

Although the above-cited designs in the field of labeling technology have achieved a considerable advance in the art, there is not satisfactorily achieved, by the above-cited designs, quick and economic adaptation of labeling machines to labeling requirements that significantly deviate from one another.

Thus, customarily, often the task arises, for example, to precisely align containers having an embossed logo, or cliplock bottles, prior to labeling. In this it is state of the art that functional units that perform this task are fixedly and permanently arranged at the labeling machine, which substantially permanently reduces the number of possible labeling stations, such that one has also not available these labeling stations in the case of processing containers that need not be aligned.

Similar considerations apply with functional units that control, for example, the presence or the correct position of labels. Again, these functional units, in accordance with the state of the art, are fixedly and permanently arranged at the labeling machines, such that the disadvantages enumerated above are also applicable in these situations.

OBJECTS

One object of an embodiment described below is to solve the problems encountered on similar apparatus of the prior art.

It is also an object to accomplish remedy and improvement, such that the labeling machines can be rapidly and economically adapted to a variety of labeling tasks.

SUMMARY

There is provided a beverage bottling plant for filling bottles with a liquid beverage filling material, said beverage bottling plant comprising: a filling machine being configured to fill empty bottles with liquid beverage filling material; a conveyer arrangement being configured and disposed to move empty bottles to said filling machine; said beverage filling machine comprising a plurality of beverage filling positions, each beverage filling position comprising a beverage filling device for filling bottles with liquid beverage filling material; said filling devices comprising an apparatus being configured to introduce a predetermined volume of liquid beverage filling material into the interior of bottles to a substantially predetermined level of liquid beverage filling material; said apparatus being configured to introduce a predetermined volume of liquid beverage filling material comprising an apparatus being configured to terminate the filling of beverage

bottles upon liquid beverage filling material reaching said substantially predetermined level in bottles; a closing station being configured and disposed to close filled bottles; a conveyer arrangement being configured and disposed to transfer filled bottles from said filling machine to said closing station; a labeling station being configured and disposed to receive bottles to be labeled; a conveyer arrangement being configured and disposed to convey bottles to said labeling station; said labeling station comprising: a frame structure, said frame structure having an axis disposed vertically; a turntable structure being configured and disposed to rotate about said vertical axis of said frame structure, said turntable structure having a peripheral region; a drive arrangement being configured and disposed to rotate said turntable structure about said vertical axis of said frame structure; a plurality of support tables being configured to support and to rotate a bottle; said support tables being disposed at said peripheral region of said turntable structure; each support table having an axis disposed vertically about which vertical axis a support table can rotate; each support table comprising a drive arrangement being configured and disposed to rotate its corresponding support table about its vertical support table axis, to permit rotation of a bottle

supported on a support table; a plurality of modules comprising: a first module comprising: at least one camera being configured and disposed to produce an image representative of the actual rotational position of a bottle supported on its corresponding support table adjacent said first module and to output signals representative of the image representative of the actual rotational position of a bottle; a computer being configured and disposed to receive from said camera the output signals representative of the actual rotational position of a bottle, to compare the image representative of the actual rotational position with an image representative of a preset rotational position, and to output signals, to the drive arrangement of an adjacent support table, to energize the drive arrangement and thus to rotate to a first position said adjacent support table and a supported bottle; a second module comprising: at least one camera being configured and disposed to produce an image representative of the actual rotational position of a bottle supported on its corresponding support table adjacent said second module and to output signals representative of the image representative of the actual rotational position of a bottle; a computer being configured and disposed to receive from said camera of said second module the output signals representative of the actual

rotational position of a bottle, to compare the image representative of the actual rotational position with an image representative of a preset rotational position, and to output signals, to the drive arrangement of said support table adjacent said second module, to energize the drive arrangement and thus to rotate to a second position said support table adjacent said second module and a supported bottle; said second position being of greater precision than said first position; a third module being configured and disposed to affix a label to a bottle disposed in said second position on a support table adjacent said third module; a fourth module being configured and disposed to print information on the label affixed to a bottle by said third, labeling, module; and a fifth module being configured and disposed to inspect for the presence of a label on a bottle, and to determine the position of a label on a bottle; each of said modules comprising a first coupling structure; a plurality of second coupling structures, each being connected to said frame structure; each first coupling structure being configured to be connectable to and to be disconnectable from its corresponding second coupling structure; and each module being configured, upon connection to a second coupling structure, to be disposed adjacent moving bottles supported on said support tables.

There is further provided a container filling plant labeling station configured to label containers, such as, bottles and cans, said labeling station comprising: a frame structure, said frame structure having an axis disposed vertically; a turntable structure being configured and disposed to rotate about said vertical axis of said frame structure, said turntable structure having a peripheral region; a drive arrangement being configured and disposed to rotate said turntable structure about said vertical axis of said frame structure; a plurality of support tables, connected to said peripheral region of said turntable structure and each being configured and disposed to support a container and to rotate a supported container; each support table comprising a drive arrangement being configured and disposed to rotate its corresponding support table, to permit rotation of a container supported on a support table; a plurality of modules at least comprising: a first module comprising: at least one sensor being configured and disposed to produce a representation of the actual position of a container supported on its corresponding support table adjacent said first module and to output signals representative of the representation of the actual position of a container; a computer being configured and disposed to receive from said sensor the output

signals representative of the representation of the actual position of a container, to compare the representation of the actual position with a representation of a preset position, and to output signals, to the drive arrangement of an adjacent support table, to energize the drive arrangement and thus to rotate to a preset position said adjacent support table and a supported container; a second module being configured and disposed to affix a label to a container disposed in said preset position on an adjacent support table; a third module being configured and disposed to inspect for the presence of a label on a container, and to determine the position of an affixed label on a container; each of said modules comprising a first coupling structure; a plurality of second coupling structures, each being connected to said frame structure; each first coupling structure being configured to be connectable to and to be disconnectable from its corresponding second coupling structure; and each module being configured, upon connection to a second coupling structure, to be disposed adjacent moving containers supported on said support tables.

There is yet further provided a container filling plant container information adding station, such as, a labeling station, configured to add information to containers, such as, bottles and cans, said

information adding station comprising: a plurality of supports, each being configured and disposed to support a container thereon; each support comprising an arrangement being configured and disposed to adjust its corresponding support, to permit adjustment of the position of a container supported on said corresponding support; a first module comprising a first sensor being configured and disposed to output signals representative of the actual position of a container disposed on a predetermined support which predetermined support is disposed in a predetermined position with respect to said first module; an arrangement being configured and disposed: to receive output signals representative of the actual position of a container disposed in a predetermined position with respect to said first module from said first sensor, to compare the representation of the actual position with a stored representation of a desired position of a container, to output signals to the adjusting arrangement of said predetermined support to move said predetermined support and the container supported thereon to the desired position; at least one second module being configured to add information to a container disposed in the desired position on said predetermined support; each module comprising a first coupling structure; said container information adding station comprising at least

one second coupling structure; each said at least one second coupling structure being configured and disposed to receive output signals related to said first sensor to adjust said predetermined support and the container supported thereon; each first coupling structure being configured to be connectable to and to be disconnectable from its corresponding second coupling structure; each module being configured, upon connection to a second coupling structure, to be disposed in a predetermined location with respect to moving containers supported on said supports.

Thus, according to one aspect it is disclosed that the functional units, such as, for example, aligning, inspecting, or printing of containers are configured as interchangeable units that have a standard interface and, in accordance with a labeling task, can be mounted rapidly and simply at different positions of a labeling machine or station. With this the above-mentioned modules can also be mounted in place of the actual labeling stations.

The above-discussed embodiments of the present invention will be described further hereinbelow. When the word "invention" or "embodiment of the invention" is used in this specification, the word "invention" or "embodiment of the invention" includes "inventions" or

"embodiments of the invention", that is the plural of "invention" or "embodiment of the invention". By stating "invention" or "embodiment of the invention", the Applicant does not in any way admit that the present application does not include more than one patentably and non-obviously distinct invention, and maintains that this application may include more than one patentably and non-obviously distinct invention. The Applicant hereby asserts that the disclosure of this application may include more than one invention, and, in the event that there is more than one invention, that these inventions may be patentable and non-obvious one with respect to the other.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments are further described in greater detail with reference to the accompanying drawings.

Figure 1A is a schematic illustration of a container filling plant in accordance with one possible embodiment;

Figure 1 shows in a simplified plan view a labeling machine in accordance with the prior art;

Figure 2 shows in a simplified plan view a labeling machine or station in accordance with one possible embodiment;

Figure 3 shows a simplified plan view of a labeling station

similar to Figure 2 with additional detail in accordance with one possible embodiment;

Figure 4 is a schematic illustration of an alignment module that is configured to determine the position of a container;

Figure 5 is a schematic illustration of a module configured to print on a container or label of a container in accordance with one possible embodiment;

Figure 6 is a schematic illustration of a further coupling structure arrangement to connect modules to the labeling station in accordance with one possible embodiment; and

Figure 7 is a side elevational view, partially in cross-section, of a connection to secure a module in accordance with one possible embodiment.

DESCRIPTION OF EMBODIMENTS

Figure 1A shows schematically the main components of one embodiment example of a system for filling containers, specifically, an embodiment of a beverage bottling plant 100 for filling bottles B with liquid beverage filling material, in accordance with one embodiment, or in which system or plant could possibly be utilized at least one aspect, or several an aspects, of the embodiments disclosed herein.

Figure 1A shows a rinser or rinser station 101, to which the containers, namely bottles B, are fed in the direction of travel as is indicated by the arrow A, by means of a conveyer line or conveyer arrangement 103, and downstream of rinser station 101, in the direction of travel as is indicated by the arrow A, the rinsed bottles B are transported to a beverage filling machine 105 by means of a conveyer line or conveyer arrangement 104 that is formed, for example, by a star wheel conveyer or a plurality of star wheels of a conveyer arrangement. The conveyer arrangement 104 may possibly have a star wheel 104a that introduces bottles B to the filling machine 105.

Downstream of the filling machine 105, in the direction of travel of the bottles B, there can preferably be a closer or closer station 106 which closes the bottles B.

The closer or closer station 106 can, for example, be connected directly to a labeling device or labeling station 108, such as, for example, by means of a conveyer line or conveyer arrangement 107 that may be formed, for example, by a plurality of star wheels of a conveyer arrangement.

In the illustrated embodiment, the labeling device or labeling

machine or labeling station 108 has, for example, three outputs, namely one output formed by a conveyer or conveyer arrangement 109 for bottles B that are filled with a first product. The first product may possibly be provided by a product mixer 123 that is connected to the filling machine 105, for example, through a conduit 121, and bottles B that are filled with a predetermined volume of liquid beverage filling material, that is, the first product, are then labeled by a labeling module 6 in the labeling stations 108 corresponding to this first product delivered from product mixer 123 to the beverage filling machine 105 and thence to the corresponding bottles B. One embodiment of a labeling station, or labeling machine, is described in greater detail herein below with reference to Figure 1.

A second output that is formed by a conveyer or conveyer arrangement 110 is provided for those bottles B that are filled with a second product. The second product may emanate from a second product mixer 124 that is connected, for example, through a conduit 122 to the filling machine 105, and these bottles B filled with a predetermined volume of liquid beverage filling material comprising the second product are then correspondingly labeled by a labeling module 6' in the labeling station 108 corresponding to this second product.

A third output, for example, formed by a conveyer or conveyer arrangement 111, removes any bottles B which have been incorrectly labeled as may have been determined by an inspecting device or an inspecting station, or an inspecting module 8 that may possibly form a part of the labeling station 108.

In Figure 1A item 112 is a central control unit or, expressed differently, a controller or a system which includes a process controller that, among other things, controls the operation of the above-referenced system or plant.

The beverage filling machine 105 is preferably of the revolving design, with a rotor 105', which revolves around a vertical machine axis. On the periphery of the rotor 105' there are a number of filling positions 113, each of which comprises bottle carriers or container carriers 113a that are configured and disposed to present bottles B for filling, as well as a filling device or element or apparatus 114 located or configured to be located above the corresponding container carrier 113a and the corresponding bottle B presented by the carrier 113a. The filling device or apparatus 114 comprises an apparatus configured to introduce a predetermined volume of liquid beverage filling material into the interior of bottles B to a predetermined level

of liquid beverage filling material. Furthermore, the filling device or apparatus comprises an apparatus configured to terminate the filling of bottles upon liquid beverage filling material reaching the predetermined level in bottles B. In other words, filling elements 114 are configured and disposed to provide a predetermined flow of liquid beverage filling material from the source thereof, such as, product mixers 123 and 124, into the bottles B.

The toroidal vessel 117 is a component, for example, of the revolving rotor 105'. The toroidal vessel 117 can be connected by means of a rotary coupling or a coupling that permits rotation, and by means of an external connecting line 121 to the external reservoir or product mixer 123 to supply the product, that is, product mix 1, for example.

As well as the more typical filling machines having one toroidal vessel, it is possible that in at least one possible embodiment a filling machine could possibly be utilized wherein each filling device 114 is preferably connected by means of two connections to a toroidal vessel 117 which contains a first product, say by means of a first connection, for example, 121, and to a second toroidal vessel which contains a second product, say by means of the second connection,

for example, 122. In this case, each filling device 114 can also preferably have, at the connections, two individually-controllable fluid or control valves, so that in each bottle B which is delivered at the inlet of the filling machine 105 to a filling position 113, the first product or the second product can be filled by means of an appropriate control of the filling product or fluid valves.

It will be understood that while a two-product assembly or system of a bottling plant is illustrated in Figure 1A, the disclosure is equally applicable to single-product installations, or other commensurate embodiments.

Figure 1 shows in a simplified plan view of a labeling machine or station or arrangement in accordance with the state of the art with three distributed label-affixing stations or labeling modules 1, 2, and 3.

There is shown in Figure 2 in a simplified plan view of a labeling machine or station that comprises two alignment modules 4 and 5, a labeling module 6, a printing module 7, and an inspecting module 8.

Further development details, advantages and possibilities of application of the invention can be obtained from the following

description of embodiments and the drawing. With this, all described and/or illustrated features *per se* or in any combination, comprise the substance of the invention, regardless of their combination in the claims or their dependency. At the same time, the content of the claims is made a component of the description.

So as to be able to adapt labeling machines more rapidly and with greater flexibility to changing labeling tasks, the present application suggests in one aspect that the necessary mechanical and/or electronic groups are combined in functional groups or modules that can be connected, by way of a standard interface at various positions of a labeling machine.

First an 'alignment' module is described.

For the case that the container is to be aligned prior to labeling, there is available that labeling machines are used that have support tables that are individually driven so as to rotate by its own servo-motor or stepping motor. This is often the case with modern labeling machines, because the provision of support tables that are driven by servo-motors or stepping motors, alone already for the realization of the rotational movements of containers *per se* that are necessary for the labeling of the containers, is highly advantageous.

When support tables are available that are driven for rotation by servo-motors or stepping motors, alignment of the containers can be realized in a simple and economical manner, because all the essential groups are already present.

For an alignment module, the present application provides in one aspect that the module comprises at least one camera and as a matter of contingency an arrangement to provide light. In a further, particularly advantageous embodiment of the present application, it is provided additionally to arrange, within a module, an evaluating computer that evaluates images produced by the at least one camera, that determines the necessary correction of the rotational position of the support table, and that transmits this correction, via the machine control of the labeling machine, to the support tables.

In a further embodiment of the present application, it is provided to transmit the necessary correction of the rotational position directly, that is, by bypassing the machine control, to the support tables. This operation considerably simplifies the program logic and the course of machine control and only a marginal expense is added. In order to realize this function, at least one sensor is associated with each support table. This sensor is disposed in the vicinity of the support

table, that is, at the outer circumference of the turntable. At least one signal source is arranged within the alignment module. In the event that the alignment module now recognizes the requirement for a correction of the rotational position, the necessary information is directly passed, via the signal source and sensor, to the servo-motor or stepping motor, or, respectively, their control of the affected support table, such that this can perform the necessary rotational movements. The signal source and sensor may be, for example, a combination of an infrared transmitter and a receiver, such that by first impulses the direction of rotation and by following impulses the magnitude of the correction of rotational position that needs to be accomplished, is transmitted.

In this it is of particular advantage that the signal source extends along a certain portion of the arc prescribed by the sensor because in this manner compensation can be provided for the rotation of the turntable.

It is also provided to utilize two or more alignment modules. This arrangement can then be of particular advantage when an alignment of the containers is to be done particularly precisely and needs to be done in a rough alignment and also a fine alignment.

In particular applications use of mechanically, optically, capacitively, or inductively operating sensors or other sensors that operate under another method known in the state of the art, may be advantageous for the determination of the actual alignment of a container, with the sensor in such applications being a part of the exchangeable module.

Aside from the above-described 'alignment' module, utilization of an 'inspecting' module is contemplated in accordance with one aspect of the application.

The function of the 'inspecting' module comprises, for example, the checking of the labeling result. This can be an inspection that merely inquires whether a label is present, or it may comprise an expanded inquiry that additionally examines the proper position of the labels. For realization of this function there is also provided use of at least one camera and/or other sensors, with the operation of the sensors encompassing all methods known in the state of the art.

A particularly advantageous development of the inspecting module comprises that an evaluation computer is part of the module.

In a further development of the inspecting module there is provided that the data that are determined within the inspecting

module, with respect to the position of the labels, can be utilized to correct the labeling. This includes, for example, automatic corrections of the rotational position of the support tables prior to or during the labeling *per se*, or also an automatic stop of the machine in the event that the labels on the containers are exceeding predetermined tolerance limits.

As well, embodiments of the inspecting module are contemplated that remove the incorrectly labeled container from further production processing.

Aside from utilization of the many solutions that have hitherto become known in the state of the art for the removal of the containers, that can also be used, it is contemplated to furnish the inspecting module *per se* with a removal arrangement. For example, this can be a vacuum-operated star-wheel disposed on the inspecting module, that partially takes the responsibility of guiding bottles and accepts and removes defective containers.

In addition to the above-described modules, the present application also proposes a printing module. This printing module can contain components that achieve all printing methods known in the art. Such printing methods can be, for example, laser printing/laser

marking, ink jet, tampon printing or sieve printing. This printing module can be employed, for example, for lettering of containers with a date of minimum stability of shelf-life, or it can be employed in the direct printing on containers or labels.

With respect to the standard interface, in accordance with one aspect, the present application proposes that aside from a mechanical connection that affords a connection free of play and that ensures precise positioning of the module at the labeling machine also electrical interfaces are provided for the transfer of drive/operating energy and control signals. Designs of connections free of play and that ensure precise positioning, as well as interfaces for the transfer of drive/operating energy are generally known in the state of the art, so that at this point a detailed description can be waived.

For the transmission of control signals, *inter alia*, bus-systems are at hand by means of which, for example, all relevant information, such as, for example, actual position, set or required angle of rotation and actual angle of rotation, set or required rotational velocity and actual rotational velocity are transferred between the machine control, to the control computers arranged on the individual modules, and all participating machine components.

Referring to Figure 3, there is illustrated a labeling station with two alignment modules 4 and 5, a labeling module 6, a printing module 7, and an inspecting module 8. The modules are connectable to frame structure 14 of the labeling station. Containers, such as, for example, bottles B, are disposed on support tables 10 that each comprise an arrangement 12 configured to adjust the position of the corresponding support table 10, for example, to adjust to a desired rotational position the support table 10 and, accordingly, the bottle B supported thereon.

Figure 4 illustrates an alignment module 4 that comprises a sensor 4a, a camera 4b, an arrangement 4c configured to generate light, and a signal generating source 4d. The module 4 has a computer 4e that processes signals provided by the camera and/or the sensor 4a and the signal generating source 4d.

The alignment module 4 has two male flange portions 4f to secure module 4 to the frame structure 14 by means of two matching female receptor structures 14a that form part of the frame structure 14.

Figure 5 illustrates a printing module 7 that comprises a print head 7a that is configured to print information on a bottle B, say, on

the bottle B *per se*, or on a label affixed to bottle B. Printing module 7 has a computer 7b and sensor or sensors 7c.

Connection of printing module 7 to the frame structure is by way of male two male flange portions 7d configured to secure module 7 to the frame structure 14 by means of two matching female receptor structures 14a that form part of the frame structure 14.

Figure 6 illustrates a plug-in type of connection of a module, generally identified by reference numeral 16. Module 16 comprises plug-in portions 16a that can be connected to receptor portions 14b of the frame structure 14.

Figure 7 illustrates one embodiment of a device to secure a plug-type connection. Figure 7 shows a portion 17 of a frame structure that has a guide or receptor 21 that is configured to receive the plug end or portion 23 of a module. The portion 23 can be secured by a bolt member 22 that can be actuated by handle 24 so as to bear on or put pressure on portion 23. Additionally, the connection may be secured by a detent and recess arrangement 25 and a flange and groove arrangement 26. It will be appreciated that a plurality of portions 23 can be secured in like manner.

Thus, the application in one aspect relates to a labeling machine

arrangement, particularly for containers and the like, comprising a machine frame structure with a drive for a turntable that is equipped with support tables for the items that are to be labeled, as well as processing stations connected to the machine frame structure, such as, for example, labeling stations or modules.

One feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the labeling machine, particularly for containers and the like, comprising a machine frame structure with a drive for a turntable that is equipped with support tables for the items that are to be labeled, as well as processing stations connected to the machine frame structure, such as, for example, labeling stations, characterized in that next to the labeling stations are disposed at least one inspecting module and/or a printing module and/or an alignment module, and that this module is configured as a replaceable unit.

Another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the arrangement characterized in that the required mechanical and/or electronic components are combined into functional groups or modules.

Yet another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the arrangement characterized in that the modules can be mounted at different positions of a labeling machine by means of a standard interface.

Still another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the arrangement characterized in that the modules each have their own computer.

A feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the arrangement characterized in that the modules have a bus-system for transfer of control information.

Another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the arrangement characterized in that the modules have an arrangement to provide light.

Yet another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the arrangement characterized in that the inspecting module

comprises at least one camera.

Still another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the arrangement characterized in that the inspecting module has sensors that sense the labels.

A further feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the arrangement characterized in that the inspecting module has sensors to sense the position of a label.

Another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the arrangement characterized in that the deviation of the actual position of the label from its required position is utilized to influence the labeling process.

Yet another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the arrangement characterized in that the deviation of the actual position of the label from its required position is utilized to disrupt the labeling process.

Still another feature or aspect of an embodiment is believed at

the time of the filing of this patent application to possibly reside broadly in the arrangement characterized in that the inspecting module has a removal unit for incorrectly labeled containers.

A further feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the arrangement characterized in that the alignment module has at least one camera.

Another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the arrangement characterized in that the alignment module has sensors that sense the degree of rotation of the containers.

Yet another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the arrangement characterized in that the alignment deviation that is determined by the alignment module can be utilized to correct, under utilization of the control of the machine, the degree of rotation of the support table that is rotatable about its vertical axis.

Still another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the arrangement characterized in that the alignment

deviation that is determined by the alignment module can be utilized to correct, under avoidance of the control of the machine, the degree of rotation of the support table that is rotatable about its vertical axis.

A further feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the arrangement characterized in that the printer module comprises at least one of the methods of: laser printing/laser marking, ink jet printing, tampon printing or sieve or screen printing.

Thus, in accordance with one aspect of the application there is proposed a labeling machine, particularly for containers and the like, comprising a machine frame structure with a drive for a turntable that is equipped with support tables for the items that are to be labeled, as well as processing stations connected to the sub-structure of the machine frame structure, such as, for example, labeling stations, there being provided that next to the labeling stations are disposed at least one inspecting module and/or a printing module and/or an alignment module, and that this module is configured as a replaceable unit.

Some examples of bottling systems that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present application may possibly be found in the following U.S.

patents, all assigned to the Assignee herein, namely: No. 4,911,285; No. 4,944,830; No. 4,950,350; No. 4,976,803; No. 4,981,547; No. 5,004,518; No. 5,017,261; No. 5,062,917; No. 5,062,918; No. 5,075,123; No. 5,078,826; No. 5,087,317; No. 5,110,402; No. 5,129,984; No. 5,167,755; No. 5,174,851; No. 5,185,053; No. 5,217,538; No. 5,227,005; No. 5,413,153; No. 5,558,138; No. 5,634,500; No. 5,713,403; No. 6,276,113; No. 6,213,169; No. 6,189,578; No. 6,192,946; No. 6,374,575; No. 6,365,054; No. 6,619,016; No. 6,474,368; No. 6,494,238; No. 6,470,922; and No. 6,463,964.

The components disclosed in the various publications, disclosed or incorporated by reference herein, may possibly be used in possible embodiments of the present invention, as well as equivalents thereof.

Some examples of methods and apparatuses for closing bottles and containers and their components that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present may possibly be found in the following U.S. patents: No. 5,398,485 issued to Osifchin on March 21, 1995; No. 5,402,623 issued to Ahlers on April 4, 1995; No. 5,419,094 issued to Vander Bush, Jr. et al. on May 30, 1995; No. 5,425,402 issued to Pringle on June 20,

1995; No. 5,447,246 issued to Finke on September 5, 1995; and No. 5,449,080 issued to Finke on September 12, 1995.

The purpose of the statements about the technical field is generally to enable the Patent and Trademark Office and the public to determine quickly, from a cursory inspection, the nature of this patent application. The description of the technical field is believed, at the time of the filing of this patent application, to adequately describe the technical field of this patent application. However, the description of the technical field may not be completely applicable to the claims as originally filed in this patent application, as amended during prosecution of this patent application, and as ultimately allowed in any patent issuing from this patent application. Therefore, any statements made relating to the technical field are not intended to limit the claims in any manner and should not be interpreted as limiting the claims in any manner.

Some examples of filling machines that utilize electronic control devices to control various portions of a filling or bottling process and that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present application may possibly be found in the following U.S. patents: No. 4,821,921 issued to

Cartwright et al. on April 18, 1989; No. 5,056,511 issued to Ronge on October 15, 1991; No. 5,273,082 issued to Paasche et al. on December 28, 1993; and No. 5,301,488 issued to Ruhl et al. on April 12, 1994.

The appended drawings in their entirety, including all dimensions, proportions and/or shapes in at least one embodiment of the invention, are accurate and are hereby included by reference into this specification.

Some examples of control systems which measure operating parameters and learn therefrom that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present application may possibly be found in the following U.S. patents: No. 4,655,188 issued to Tomisawa et al. on April 7, 1987; No. 5,191,272 issued to Torii et al. on March 2, 1993; No. 5,223,820, issued to Sutterlin et al. on June 29, 1993; and No. 5,770,934 issued to Theile on June 23, 1998.

Some examples of memories that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present application may possibly be found in the following U.S. Patents: No. 5,789,887 issued to Elischewski on August 4, 1998; No.

5,453,736 issued to Noren on September 26, 1995; No. 5,315,220 issued to Takimoto et al. on May 24, 1994; No. 4,994,724 issued to Hsu on February 19, 1991; No. 4,498,033 issued to Aihara et al. on February 5, 1985; and No. 4,328,540 issued to Matsuoka et al. on May 4, 1982.

The background information is believed, at the time of the filing of this patent application, to adequately provide background information for this patent application. However, the background information may not be completely applicable to the claims as originally filed in this patent application, as amended during prosecution of this patent application, and as ultimately allowed in any patent issuing from this patent application. Therefore, any statements made relating to the background information are not intended to limit the claims in any manner and should not be interpreted as limiting the claims in any manner.

Some examples of microprocessors that may possibly be utilized or possibly adapted for use in a possible embodiment of the present application may possibly be found in the following U.S. patents: No. 5,770,934 issued to Theile on June 23, 1998; No. 5,653,056 issued to Stark on August 5, 1997; No. 5,647,173, issued to Stark et al. on

July 15, 1997; No. 5,625,266 issued to Stark on April 29, 1997; No. 5,479,151 issued to Lavelle et al. on December 26, 1995; and No. 5,453,736 issued to Noren on September 26, 1995.

All, or substantially all, of the components and methods of the various embodiments may be used with at least one embodiment or all of the embodiments, if more than one embodiment is described herein.

Some examples of open-loop control systems that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present application may possibly be found in the following U.S. patents: No. 5,770,934 issued to Theile on June 23, 1998; No. 5,210,473 issued to Backstrand on May 11, 1993; No. 5,320,186 issued to Strosser et al. on June 14, 1994; and No. 5,369,342 issued to Rudzewicz et al. on Nov. 29, 1994.

The purpose of the statements about the object or objects is generally to enable the Patent and Trademark Office and the public to determine quickly, from a cursory inspection, the nature of this patent application. The description of the object or objects is believed, at the time of the filing of this patent application, to adequately describe the object or objects of this patent application. However, the description of the object or objects may not be completely applicable

to the claims as originally filed in this patent application, as amended during prosecution of this patent application, and as ultimately allowed in any patent issuing from this patent application. Therefore, any statements made relating to the object or objects are not intended to limit the claims in any manner and should not be interpreted as limiting the claims in any manner.

Some examples of closed-loop control circuits that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present application may possibly be found in the following U.S. patents: No. 5,770,934 issued to Theile on June 23, 1998; No. 5,189,605 issued to Zuehlke et al. on February 23, 1993; No. 5,223,072 issued to Brockman et al. on June 29, 1993; and No. 5,252,901, issued to inventors Ozawa et al. on Oct. 12, 1993.

All of the patents, patent applications and publications recited herein, and in the Declaration attached hereto, are hereby incorporated by reference as if set forth in their entirety herein.

Some examples of look up tables accessed by computers or microprocessors that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present application may possibly be found in the following U.S. patents: No. 5,284,116

issued to Richeson, Jr. on February 8, 1994; No. 5,359,325 issued to Ford et al. on October 25, 1994; and No. 5,371,537 issued to Bohan et al. on December 6, 1994.

The summary is believed, at the time of the filing of this patent application, to adequately summarize this patent application.

However, portions or all of the information contained in the summary may not be completely applicable to the claims as originally filed in this patent application, as amended during prosecution of this patent application, and as ultimately allowed in any patent issuing from this patent application. Therefore, any statements made relating to the summary are not intended to limit the claims in any manner and should not be interpreted as limiting the claims in any manner.

Some examples of databuses or databus systems that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present application may possibly be found in the following U.S. patents: No. 6,008,546 issued to Sage on December 28, 1999; No. 5,978,193 issued to Kaaden on November 2, 1999; No. 5,815,732 issued to Cooper et al. on September 29, 1998; No. 5,507,001 issued to Nishizawa on April 9, 1996; No. 5,402,423 issued to Van Kersen on March 28, 1995; and No. 4,725,838 issued

to Maschek et al. on February 16, 1998.

All of the references and documents, cited in any of the documents cited herein, are hereby incorporated by reference as if set forth in their entirety herein. All of the documents cited herein, referred to in the immediately preceding sentence, include all of the patents, patent applications and publications cited anywhere in the present application.

Some examples of cameras or the like optical monitoring apparatus that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present application may possibly be found in the following U.S. patents: No. 5,233,186 issued to Ringlien on August 3, 1993; No. 5,243,400 issued to Ringlien on September 7, 1993; No. 5,369,713 issued to Schwartz et al. on November 29, 1994; No. 5,442,446 issued to Gerber et al. on August 15, 1995; No. 5,661,295 issued to Buchmann et al. on August 26, 1997; and No. 5,898,169 issued to Nodbryhn on April 27, 1999.

The corresponding foreign patent publication applications, namely, Federal Republic of Germany Patent Application No. DE P 103 06 671, filed on February 18, 2003, having inventor Heinz-Michael ZWILLING, and DE-OS 103 06 671, having inventor Heinz-

Michael ZWILLING, and DE-PS 103 06 671, having inventor Heinz-Michael ZWILLING, as well as their published equivalents, and other equivalents or corresponding applications, if any, in corresponding cases in the Federal Republic of Germany and elsewhere, and the references and documents cited in any of the documents cited herein, such as the patents, patent applications and publications, are hereby incorporated by reference as if set forth in their entirety herein.

Some examples of interface arrangements that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present application may possibly be found in the following U.S. patents: No. 5,001,704 issued to Narup et al. on March 19, 1991; No. 5,961,356 issued to Fekete on October 5, 1999; No. 6,621,692 issued to Johnson et al. on September 16, 2003; No. 6,661,961 issued to Allen et al. on December 9, 2003; No. 6,687,166 issued to Takahashi et al. on February 3, 2004; and No. 6,687,779 issued to Sturm et al. on February 3, 2004.

The description of the embodiment or embodiments is believed, at the time of the filing of this patent application, to adequately describe the embodiment or embodiments of this patent application. However, portions of the description of the embodiment or

embodiments may not be completely applicable to the claims as originally filed in this patent application, as amended during prosecution of this patent application, and as ultimately allowed in any patent issuing from this patent application. Therefore, any statements made relating to the embodiment or embodiments are not intended to limit the claims in any manner and should not be interpreted as limiting the claims in any manner.

Some examples of rotation sensors that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present application may possibly be found in the following U.S. patents: No. 6,246,232 issued to Okamura on June 12, 2001; No. 6,448,761 issued to Stumpe on September 10, 2002; No. 6,474,162 to Voss et al. on November 5, 2002; No. 6,498,481 issued to Apel on December 24, 2002; No. 6,532,831 issued to Jin et al. on March 18, 2003; and No. 6,672,175 issued to Jin et al. on January 6, 2004.

The details in the patents, patent applications and publications may be considered to be incorporable, at applicant's option, into the claims during prosecution as further limitations in the claims to patentably distinguish any amended claims from any applied prior art.

Some examples of infrared sensor and infrared receiving

arrangements that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present application may possibly be found in the following U.S. patents: No. 4,533,226 issued to Odone on August 6, 1985; No. 5,815,108 issued to Terk on September 29, 1998; No. 6,010,399 issued to Lee et al. on January 4, 2000; No. 6,262,661 issued to Mahler et al. on July 17, 2001; and No. 6,377,174 issued to Siegwart et al. on April 23, 2002.

The purpose of the title of this patent application is generally to enable the Patent and Trademark Office and the public to determine quickly, from a cursory inspection, the nature of this patent application. The title is believed, at the time of the filing of this patent application, to adequately reflect the general nature of this patent application. However, the title may not be completely applicable to the technical field, the object or objects, the summary, the description of the embodiment or embodiments, and the claims as originally filed in this patent application, as amended during prosecution of this patent application, and as ultimately allowed in any patent issuing from this patent application. Therefore, the title is not intended to limit the claims in any manner and should not be interpreted as limiting the claims in any manner.

Some examples of light sensors that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present application may possibly be found in the following U.S. patents: No. 4,899,041 issued to Fetter et al. on February 6, 1990; No. 5,225,689 issued to Bückle et al. on July 6, 1993; No. 5,365,059 issued to Savage on November 15, 1994; No. 5,736,733 issued to Shima et al. on April 7, 1998; No. 6,493,567 issued to Krivitski et al. on December 10, 2002; and No. 6,566,672 issued to Schlough et al. on May 20, 2003.

The abstract of the disclosure is submitted herewith as required by 37 C.F.R. §1.72(b). As stated in 37 C.F.R. §1.72(b):

A brief abstract of the technical disclosure in the specification must commence on a separate sheet, preferably following the claims, under the heading "Abstract of the Disclosure." The purpose of the abstract is to enable the Patent and Trademark Office and the public generally to determine quickly from a cursory inspection the nature and gist of the technical disclosure. The abstract shall not be used for interpreting the scope of the claims.

Therefore, any statements made relating to the abstract are not

intended to limit the claims in any manner and should not be interpreted as limiting the claims in any manner.

Some examples of stepping motors that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present application may possibly be found in the following U.S. patents: No. 6,348,774 issued to Andersen et al. on February 19, 2002; No. 6,373,209 issued to Gerber et al. on April 16, 2002; No. 6,424,061 issued to Fukuda et al. on July 23, 2002; No. 6,509,663 issued to Aoun on January 21, 2003; No. 6,548,923 to Ohnishi et al. on April 15, 2003; and No. 6,661,193 issued to Tsai on December 9, 2003.

Some examples of servo-motors that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present application may possibly be found in the following U.S. patents: No. 4,050,434 issued to Zbikowski et al. on September 27, 1977; No. 4,365,538 issued to Andoh on December 28, 1982; No. 4,550,626 issued to Brouter on November 5, 1985; No. 4,760,699 issued to Jacobsen et al. on August 2, 1988; No. 5,076,568 issued to de Jong et al. on December 31, 1991; and No. 6,025 issued to Yasui on February 15, 2000.

Some examples of laser printing arrangements that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present application may possibly be found in the following U.S. patents: No. 4,847,643 issued to Ohmori on July 11, 1989; No. 5,294,945 issued to Omura et al. on March 15, 1994; No. 5,528,280 issued to Endo et al. on June 18, 1996; No. 6,210,778 issued to Poirier et al. on April 3, 2001; No. 6,433,810 issued to Katayama et al. on August 13, 2002; and No. 6,655,275 issued to Mugrauer on December 2, 2003.

Some examples of laser marking that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present application may possibly be found in the following U.S. patents: No. 6,429,889 issued to Murokh on August 6, 2002; No. 6,483,073 issued to Tenderly on November 19, 2002; No. 6,489,985 issued to Brodsky et al. on December 3, 2002; No. 6,613,161 issued to Zheng et al. on September 2, 2003; No. 6,627,299 issued to Feng et al. on September 30, 2003; and No. 6,683,637 issued to Corbett on January 27, 2004.

Some examples of ink jet printing apparatus and methods that may possibly be utilized or possibly adapted for use in at least one

possible embodiment of the present application may possibly be found in the following U.S. patents: No. 6,582,047 issued to Koitabashi et al. on June 24, 2003; No. 6,623,093 issued to Takahashi et al. on September 23, 2003; No. 6,625,351 issued to Cox et al. on September 23, 2003; No. 6,652,055 issued to Oikawa on November 25, 2003; No. 6,669,767 issued to Blease et al. on December 30, 2003; and No. 6,688,739 issued to Murray on February 10, 2004.

Some examples of screen printing apparatus that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present application may possibly be found in the following U.S. patents: No. 5,374,449 issued to Bühlmann et al. on December 20, 1994; No. 5,722,321 issued to Szyszko et al. on March 3, 1998; No. 6,591,745 issued to Miyahara et al. on July 15, 2003; No. 6,601,502 issued to Kamen et al. on August 5, 2003; No. 6,619,197 issued to Murakami et al. on September 16, 2003; and No. 6,659,005 issued to Takahashi et al. on December 9, 2003.

Some examples of tampon printing apparatus that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present application may possibly be found in the following U.S. patents: No. 4,723,485 issued to Berberich et al. on

February 9, 1988; No. 5,003,872 issued to Dalferth on April 2, 1991; No. 5,383,398 issued to Binned on January 24, 1995; No. 5,222,433 issued to Philipp on June 29, 1993; No. 5,802,972 issued to Hoffmann et al. on September 8, 1998; and No. 6,619,203 issued to Philipp on September 16, 2003.

Some examples of connecting arrangements that may possibly be utilized or possibly adapted for use in at least one possible embodiment may possibly be found in the following U.S. patents: No. 4,648,630 issued to Bruch on March 10, 1987; No. 5,964,483 issued to Long et al. on October 12, 1999; No. 6,299,215 issued to Kirby on October 9, 2001; No. 6,318,410 issued to Miyajima et al. on November 20, 2001; No. 6,644,884 issued to Gledhill on November 11, 2003; and No. 6,675,833 issued to Maldavs on January 13, 2004.

It will be understood that the examples of patents, published patent applications, and other documents which are included in this application and which are referred to in paragraphs which state "Some examples of ... which may possibly be used in at least one possible embodiment of the present application..." may possibly not be used or useable in any one or more embodiment of the application.

The sentence immediately above relates to patents, published

patent applications and other documents either incorporated by reference or not incorporated by reference.

Thus, in one aspect of the application there is proposed a labeling machine, particularly for containers and the like, comprising a machine frame structure with a drive for a turntable that is equipped with support tables for the items that are to be labeled, as well as processing stations connected to the sub-structure of the machine frame structure, such as, for example, labeling stations, there being provided that next to the labeling stations are disposed at least one inspecting module and/or a printing module and/or an alignment module, and that this module is configured as a replaceable unit.

Some examples of quick release devices or structures, or related devices or structures, that may possibly be utilized or possibly adapted for use in at least one possible embodiment may possibly be found in the following patents, patent publications, and other references: US 1835251, issued Dec., 1931 Wetstein; US 1899360, issued Feb., 1933 to Roudebush et al; US 2384267, issued Sep., 1945 to Andersen; US 2872139, issued Oct., 1953 to Bedford, Jr; US 2714195, issued Jul., 1955 to Beatty; US 2760174, issued Aug., 1956 to Burtt et al; US 2737008, issued Oct., 1956 to Oswald; US 2881404,

issued Apr., 1959 to Kamm; US 2899669, issued Aug., 1959 to Johanson; US 3017232, issued Jan., 1962 to Schwab et al; US 3035243, issued May., 1962 to Bowling; US 3311863, issued Mar., 1967 to Beale; US 3398390, issued Aug., 1968 to Long; US 3408614, issued Oct., 1968 to Kuwahata; US 3451034, issued Jun., 1969 to Beale; US 3476258, issued Nov., 1969 to Dorsett; US 3495206, issued Feb., 1970 to Pfister; US 3518612, issued Jun., 1970 to Dunman et al; US 3566190, issued Feb., 1971 to Huebner et al; US 3566336, issued Feb., 1971 to Johnson et al; US 3576515, issued Apr., 1971 to Frantz; US 3594698, issued Jul., 1971 to Anhalt; US 3668605, issued Jun., 1972 to Albert; US 3736471, issued May., 1973 to Donze et al; US 3767974, issued Oct., 1973 to Donovan, Jr. et al; US 3784954, issued Jan., 1974 to Grimm et al; US 3798507, issued Mar., 1974 to Damon et al; US 3803409, issued Apr., 1974 to Prochazka; US 3806225, issued Apr., 1974 to Codrino; US 3809908, issued May., 1974 to Clanton; US 3915538, issued Oct., 1975 to Gruhn, Jr. et al; US 3950059, issued Apr., 1976 to Anhalt et al; US 3951514, issued Apr., 1976 to Medina, Jr; US 3952232, issued Apr., 1976 to Coules; US 4045109, issued Aug., 1977 to Langenbach et al; US 4064551, issued Dec., 1977 to Lightfoot; US 4070081, issued Jan., 1978 to

Takahashi; US 4083616, issued Apr., 1978 to McNiece et al; US 4084882, issued Apr., 1978 to Hogan et al; US 4140367, issued Feb., 1979 to Makuch et al; US 4149072, issued Apr., 1979 to Smith et al; US 4152038, issued May., 1979 to Inouye et al; US 4167303, issued Sep., 1979 to Bowen et al; US 4197572, issued Apr., 1980 to Aimar; US 4217030, issued Aug., 1980 to Howarth; US 4226491, issued Oct., 1980 to Kazama et al; US 4233646, issued Nov., 1980 to Leung et al; US 4243283, issued Jan., 1981 to McSparran; US 4260210, issued Apr., 1981 to Babuka et al.; US 4268114, issued May., 1981 to dAuria et al; US 4273413, issued Jun., 1981 to Bendiksen et al; US 4295181, issued Oct., 1981 to Chang et al; US 4301494, issued Nov., 1981 to Jordan; US 4313150, issued Jan., 1982 to Chu; US 4377318, issued Mar., 1983 to Long; US 4384368, issued May., 1983 to Rosenfeldt et al; US 4387956, issued Jun., 1983 to Cline; US 4398073, issued Aug., 1983 to Botz et al; US 4406514, issued Sep., 1983 to Hillegonds et al; US 4410222, issued Oct., 1983 to Enomoto et al; US 4427879, issued Jan., 1984 to Becher et al; US 4432604, issued Feb., 1984 to Schwab; US 4439006, issued Mar., 1984 to Stevenson; US 4445740, issued May., 1984 to Wallace; US 4448467, issued May., 1984 to Weidler; US 4449784, issued May., 1984 to

Basov et al; US 4460230, issued Jul., 1984 to McKee et al; US 4470660, issued Sep., 1984 to Hillegonds et al; US 4477133, issued Oct., 1984 to Cosmo; US 4477146, issued Oct., 1984 to Bowen et al; US 4491981, issued Jan., 1985 to Weller et al; US 4522463, issued Jun., 1985 to Schwenda et al; US 4526427, issued Jul., 1985 to Boll et al; US 4527285, issued Jul., 1985 to Kekas et al; US 4541036, issued Sep., 1985 to Landries et al; US 4548467, issued Oct., 1985 to Stoerk et al; US 4553813, issued Nov., 1985 to McNaughton et al; US 4553814, issued Nov., 1985 to Bahl et al; US 4611887, issued Sep., 1986 to Glover et al; US 4619493, issued Oct., 1986 to Kikuta; US 4678264, issued Jul., 1987 to Bowen et al; US 4684210, issued Aug., 1987 to Matsunaga et al; US 4699438, issued Oct., 1987 to Kikuta; US 4699455, issued Oct., 1987 to Erbe et al; US 4737008, issued Apr., 1988 to Ohyama et al; US 4756593, issued Jul., 1988 to Koakutsu et al; US 4762388, issued Aug., 1988 to Tanaka et al; US 4767179, issued Aug., 1988 to Sampson et al; US 4787706, issued Nov., 1988 to Cannon, Jr. et al; US 4789218, issued Dec., 1988 to Paul et al; US 4798430, issued Jan., 1989 to Johnson et al; US 4798440, issued Jan., 1989 to Hoffer et al; US 4821145, issued Apr., 1989 to Corfits et al; US 4838810, issued Jun., 1989 to Yoshimura et

al; US 4840451, issued Jun., 1989 to Sampson et al; US 4861134, issued Aug., 1989 to Alameel et al; US 4872736, issued Oct., 1989 to Myers et al; US 4900263, issued Feb., 1990 to Manassero et al; US 4906197, issued Mar., 1990 to Noll; US 4944568, issued Jul., 1990 to Danbach et al; US 4960317, issued Oct., 1990 to Briggs et al; US 4969924, issued Nov., 1990 to Suverison et al; US 4986625, issued Jan., 1991 to Yamada et al; US 4991062, issued Feb., 1991 to Nguyenngoc; US 4995821, issued Feb., 1991 to Casey; US 4997386, issued Mar., 1991 to Kawachi et al; US 5005939, issued Apr., 1991 to Arvanitakis et al; US 5011425, issued Apr., 1991 to Van Zanten et al; US 5013247, issued May., 1991 to Watson; US 5016968, issued May., 1991 to Hammond et al; US 5021003, issued Jun., 1991 to Ohtaka et al; US 5039194, issued Aug., 1991 to Block et al; US 5042891, issued Aug., 1991 to Mulholland et al; US 5044982, issued Sep., 1991 to Bertini; US 5062806, issued Nov., 1991 to Ohno et al; US 5067785, issued Nov., 1991 to Schirbl et al; US 5071219, issued Dec., 1991 to Yurtin et al; US 5073045, issued Dec., 1991 to Abendschein; US 5073046, issued Dec., 1991 to Edwards et al; US 5076656, issued Dec., 1991 to Briggs et al; US 5082344, issued Jan., 1992 to Mulholland et al; US 5083931, issued Jan., 1992 to Davidge

et al; US 5084802, issued Jan., 1992 to Nguyenngoc; US 5091991, issued Feb., 1992 to Briggs et al; US 5099307, issued Mar., 1992 to Go et al; US 5101463, issued Mar., 1992 to Cubukciyan et al; US 5104243, issued Apr., 1992 to Harding; US 5109453, issued Apr., 1992 to Edwards et al; US 5113467, issued May., 1992 to Peterson et al; US 5116239, issued May., 1992 to Siwinski; US 5117476, issued May., 1992 to Yingst et al; US 5118904, issued Jun., 1992 to Nguyenngoc; US 5125849, issued Jun., 1992 to Briggs et al; US 5134679, issued Jul., 1992 to Robin et al; US 5138678, issued Aug., 1992 to Briggs et al; US 5140663, issued Aug., 1992 to Edwards et al; US 5142597, issued Aug., 1992 to Mulholland et al; US 5155786, issued Oct., 1992 to Ecker et al; US 5159652, issued Oct., 1992 to D'Alphonse et al.; US 5163109, issued Nov., 1992 to Okugawa et al; US 5163847, issued Nov., 1992 to Regnier; US 5183404, issued Feb., 1993 to Aldous et al; US 5195911, issued Mar., 1993 to Murphy; US 5199093, issued Mar., 1993 to Longhurst; US 5204929, issued Apr., 1993 to Machall et al; US 5212681, issued May., 1993 to Bock et al; US 5212761, issued May., 1993 to Petrunia; US 5218519, issued Jun., 1993 to Welch et al; US 5234353, issued Aug., 1993 to Scholz et al; US 5238426, issued Aug., 1993 to Arnett; US 5243678, issued Sep.,

1993 to Schaffer et al; US 5247427, issued Sep., 1993 to Driscoll et al; US 5253320, issued Oct., 1993 to Takahashi et al; US 5259052, issued Nov., 1993 to Briggs et al; US 5262923, issued Nov., 1993 to Batta et al; US 5274729, issued Dec., 1993 to King et al; US 5283680, issued Feb., 1994 to Okugawa et al; US 5286207, issued Feb., 1994 to McHugh; US 5289345, issued Feb., 1994 to Corradetti et al; US 5295212, issued Mar., 1994 to Morton et al; US 5315679, issued May., 1994 to Baldwin et al; US 5317663, issued May., 1994 to Beard et al; US 5325454, issued Jun., 1994 to Rittle et al; US 5325455, issued Jun., 1994 to Henson et al; US 5329428, issued Jul., 1994 to Block et al; US 5329604, issued Jul., 1994 to Baldwin et al; US 5333221, issued Jul., 1994 to Briggs et al; US 5337396, issued Aug., 1994 to Chen et al; US 5361318, issued Nov., 1994 to Go et al.; US 5363465, issued Nov., 1994 to Korkowski et al; US D353796, issued Dec., 1994 to Oliver et al; US D354271, issued Jan., 1995 to Speiser et al; US 5383793, issued Jan., 1995 to Hsu et al; US 5386346, issued Jan., 1995 to Gleadall; US 5390268, issued Feb., 1995 to Morlion et al; US 5398295, issued Mar., 1995 to Chang et al; US 5411402, issued May., 1995 to Bethurum; US 5412497, issued May., 1995 to Kaetsu et al; US 5425646, issued Jun., 1995 to Green;

US 5442726, issued Aug., 1995 to Howard et al; US 5452388, issued Sep., 1995 to Rittle et al; US 5463532, issued Oct., 1995 to Petitpierre et al; US 5469526, issued Nov., 1995 to Rawlings; US 5470238, issued Nov., 1995 to Walden; US 5481634, issued Jan., 1996 to Anderson et al; US 5487678, issued Jan., 1996 to Tsuji et al; US 5491613, issued Feb., 1996 to Petitpierre; US 5515468, issued May., 1996 to DeAndrea et al; US 5528408, issued Jun., 1996 to McGinley et al; US 5546281, issued Aug., 1996 to Poplawski et al; US 5548677, issued Aug., 1996 to Kakii et al; US 5561727, issued Oct., 1996 to Akita et al; US 5583745, issued Dec., 1996 to Uwabo et al; US 5596663, issued Jan., 1997 to Ishibashi et al; US 5600470, issued Feb., 1997 to Walsh; US 5604831, issued Feb., 1997 to Dittman et al; US 5654873, issued Aug., 1997 to Smithson et al; US 5659459, issued Aug., 1997 to Wakabayashi et al; US D389802, issued Jan., 1998 to Vernon; US 5717533, issued Feb., 1998 to Poplawski et al; US 5734558, issued Mar., 1998 to Poplawski et al; US 5738538, issued Apr., 1998 to Bruch et al; US 5757998, issued May., 1998 to Thatcher et al; US 5766027, issued Jun., 1998 to Fogg; US 5767999, issued Jun., 1998 to Kayner; US 5797771, issued Aug., 1998 to Garside; US 5864468, issued Jan., 1999 to Poplawski et al;

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The embodiments of the invention described herein above in the context of the preferred embodiments are not to be taken as limiting

the embodiments of the invention to all of the provided details thereof, since modifications and variations thereof may be made without departing from the spirit and scope of the embodiments of the invention.